

What is claimed is:

1. A detector for detecting a target object approaching inside detection areas, said detector comprising:

5 a wave outputting device for outputting waves at a specified transmission timing;  
a transmission antenna for transmitting transmission waves outputted by said wave outputting device as electromagnetic waves into space;

a reception antenna for receiving the electromagnetic waves transmitted from said transmission antenna and reflected from said target object;

10 a plurality of wave detection circuit parts for mixing wave detection signals corresponding to said transmission waves with signals received by said reception antenna at different sampling timings and outputting the mixed signals; and

a plurality of judging circuit parts each corresponding to different one of said wave detection circuit parts and serving to switch on a detection output based on the  
15 outputted signals from said wave detection circuit parts to indicate that said target object is approaching;

wherein said detection areas have different sizes for each of said judging circuit parts corresponding to said different sampling timings of said wave detection circuit parts.

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2. The detector of claim 1 which is provided to a structure with a lockable part having a handle and being adapted to open and close, said target object being a hand of a user approaching said handle.

25 3. A detector using electromagnetic waves and having a plurality of detection areas with different sizes, said detector comprising:

a sensor circuit for switching on a detection output by detecting in each of said detection areas presence of a target object; and

a correcting device for concluding that said target object is absent if the detection  
30 outputs associated with said plurality of detection areas are switched on substantially simultaneously.

4. The detector of claim 3 which is provided to a structure with a lockable part having a handle and being adapted to open and close, said target object being a hand of a user approaching said handle.

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5. A detector for detecting a target object approaching inside a detection area, said detector comprising:

a wave outputting device for outputting waves at a specified transmission timing;

a transmission antenna for transmitting transmission waves into air as

10 electromagnetic waves by said wave outputting device;

a reception antenna for receiving the electromagnetic waves transmitted from said transmission antenna and reflected from said target object;

a wave detection circuit part for mixing wave detection signals corresponding to said transmission waves with signals received by said reception antenna at a specified  
15 sampling timing and outputting the mixed signals; and

a judging circuit part serving to switch on a detection output based on the outputted signals from said wave detection circuit part to indicate that said target object is approaching;

wherein the size of said detection area changes corresponding to said specified  
20 sampling timing.

6. The detector of claim 5 which is provided to a structure with a lockable part having a handle and being adapted to open and close, said target object being a hand of a user approaching said handle.

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7. A lock controller comprising a detector according to claim 2 and a main apparatus which is provided to a structure with a lockable part having a handle and being adapted to open and close, wherein said main apparatus is adapted to send by wireless transmission a specified request signal to a portable device carried by said user if a  
30 detection output corresponding to a specified one of said detection areas of said detector is switched on while said structured is locked, said specified one being not the smallest of

said detection areas, to receive an answer signal from said portable device in response to said request signal, and to cause said lockable part to be unlocked after ascertaining that specified conditions for unlocking are satisfied, said specified conditions including condition that said received answer signal be a correct signal.

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8. The lock controller of claim 7 wherein said specified conditions also include another condition that the detection output corresponding to another detection area smaller than said one detection area be switched on after the detection output corresponding to said specified detection area is switched on.

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9. The lock controller of claim 7 wherein said main apparatus is adapted to send by wireless transmission another specified request signal to said portable device carried by said user if a detection output corresponding to a detection area smaller than said one detection area of said detector is switched on while said structured is unlocked, to receive an answer signal from said portable device in response to said request signal, and to cause said structure to be locked after ascertaining that said received answer signal is a correct signal.

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10. The lock controller of claim 8 wherein said main apparatus is adapted to send by wireless transmission another specified request signal to said portable device carried by said user if a detection output corresponding to a detection area smaller than said one detection area of said detector is switched on while said structured is unlocked, to receive an answer signal from said portable device in response to said request signal, and to cause said structure to be locked after ascertaining that said received answer signal is a correct signal.

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11. A lock controller comprising a detector according to claim 4 and a main apparatus which is provided to a structure with a lockable part having a handle and being adapted to open and close, wherein said main apparatus is adapted to send by wireless transmission a specified request signal to a portable device carried by said user if a detection output corresponding to a specified one of said detection areas of said detector

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is switched on while said structured is locked, said specified one being not the smallest of said detection areas, to receive an answer signal from said portable device in response to said request signal, and to cause said lockable part to be unlocked after ascertaining that specified conditions for unlocking are satisfied, said specified conditions including  
5 condition that said received answer signal be a correct signal.

12. The lock controller of claim 11 wherein said specified conditions also include another condition that the detection output corresponding to another detection area smaller than said one detection area be switched on after the detection output  
10 corresponding to said specified detection area is switched on.

13. The lock controller of claim 11 wherein said main apparatus is adapted to send by wireless transmission another specified request signal to said portable device carried by said user if a detection output corresponding to a detection area smaller than  
15 said one detection area of said detector is switched on while said structured is unlocked, to receive an answer signal from said portable device in response to said request signal, and to cause said structure to be locked after ascertaining that said received answer signal is a correct signal.

20 14. The lock controller of claim 12 wherein said main apparatus is adapted to send by wireless transmission another specified request signal to said portable device carried by said user if a detection output corresponding to a detection area smaller than said one detection area of said detector is switched on while said structured is unlocked, to receive an answer signal from said portable device in response to said request signal,  
25 and to cause said structure to be locked after ascertaining that said received answer signal is a correct signal.

15. A lock controller comprising a detector according to claim 6 and a main apparatus which is provided to a structure with a lockable part having a handle and being  
30 adapted to open and close;

wherein said main apparatus, when said lockable part in locked, is adapted to set the specified sampling timing of said wave detection circuit part so as to make said detection area relatively large, to send by wireless transmission a specified request signal to a portable device carried by said user if a detection output of said detector is switched  
5 on with said detection area made relatively large, to receive an answer signal from said portable device in response to said request signal, and to cause said lockable part to be unlocked after ascertaining that specified conditions for unlocking are satisfied, said specified conditions including condition that said received answer signal be a correct signal; and

10 wherein said main apparatus, when said lockable part is unlocked, is adapted to set the specified sampling timing of said wave detection circuit part so as to make said detection area relatively small, to send by wireless transmission a specified request signal to said portable device carried by said user if a detection output of said detector is switched on with said detection area made relatively small, to receive an answer signal  
15 from said portable device in response to said request signal, and to cause said lockable structure to be locked after ascertaining that said received answer signal is a correct signal.

16. The lock controller of claim 15 wherein said specified conditions further  
20 include condition that said detection output be switched on with said detection area made relatively small by setting said specified sampling timing of said wave detection circuit part accordingly after said detection output becomes switched on with said sampling timing of said wave detection circuit part set so as to make said detection area relatively large.

25 17. The detector of claim 2 wherein said judging parts includes bandpass filters and said detection output is switched on only if said target object is judged to be approaching at a speed within a specified range.

18. The detector of claim 4 wherein said judging parts includes bandpass filters and said detection output is switched on only if said target object is judged to be approaching at a speed within a specified range.

5 19. The detector of claim 6 wherein said judging parts includes bandpass filters and said detection output is switched on only if said target object is judged to be approaching at a speed within a specified range.